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Rethinking Polanyi's Concept of Tacit Knowledge:

From Personal Knowing to Imagined Institutions

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Abstract. Half a century after Michael Polanyi conceptualised 'the tacit component' in personal knowing, management studies has reinvented 'tacit knowledge'—albeit in ways that squander the advantages of Polanyi's insights and ignore his faith in 'spiritual reality'. While tacit knowing challenged the absurdities of sheer objectivity, expressed in a 'perfect language', it fused *rational* knowing, based on personal experience, with *mystical* speculation about an un-experienced 'external reality'. Faith alone saved Polanyi's model from solipsism. But Ernst von Glasersfeld's radical constructivism provides scope to rethink personal tacit knowing with regard to 'other people' and the intersubjectively viable construction of 'experiential reality'. By separating tacit knowing from Polanyi's metaphysical realism and drawing on Benedict Anderson's concept of 'imagined communities', it is possible to conceptualise 'imagined institutions' as the tacit dimension of power that shapes human interaction. Whereas Douglass North claimed institutions could be reduced to rules, imagined institutions are known in ways we cannot tell.

Keywords Michael Polanyi · tacit knowing · realism · truth · radical constructivism · imagined institutions

Introduction

Michael Polanyi (1891-1976) served on *Minerva*'s Editorial Board and published two important articles in this journal (Polanyi 1962, 1967). He qualified as a physician, became one of the world's leading physical chemists and, comparatively late in life, turned to philosophy. After his major philosophical work *Personal Knowledge*

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(Polanyi 1974) was published in 1958, a review by the philosopher, Michael Oakeshott, cautioned that it was: ‘disordered, repetitive, digressive and often obscure; as a work of art it leaves much to be desired’ (Oakeshott 1958 p. 77). Even the editors of a substantial *Festschrift* in honour of Polanyi’s contribution to philosophy conceded that the book had limitations: ‘There can be no doubt that *Personal Knowledge* comes at us with its rhetoric all out of focus. It is a mixed bag’ (Langford and Poteat 1968, p. 6). Yet, *Personal Knowledge* was genuinely innovative in its attempt to avoid the absurdities of ‘sheer objectivity’ and the assumption that science—or anything else—could be expressed in a value-free ‘perfect language’, which anyone could understand and no one would misunderstand. *Personal Knowledge* conceptualised the ineffable tacit component in *all* personal knowing and established a trajectory that came to a ‘climax of clarification’ (Prosch 1986, p. 52) in *The Tacit Dimension* (Polanyi 1983), published in 1966. Tacit knowing encapsulates the idea that ‘*we can know more than we can tell*’ (Polanyi 1983, p. 4 original emphasis); we are the subjects—not the objects—of our own experience (Hall 1979, p. 272). And this simple proposition has far-reaching implications.

While mainstream philosophy often overlooks Polanyi’s insight into tacit knowing, the influential Japanese management guru, Ikujiro Nonaka (Nonaka 1991; Nonaka and Takeuchi 1995; Nonaka, Toyama and Konno 2000; Takeuchi and Nonaka 2004; Nonaka, Toyama and Hirata 2008), has reinvented Polanyi’s concept for a new and adoring audience. Evidently, Peter Drucker described Nonaka’s account of Japan’s knowledge-creating companies, co-authored with Hirotaka Takeuchi (Nonaka and Takeuchi 1995), as a ‘classic’ (Takeuchi and Nonaka 2004, p. ix), while David Teece has dubbed Nonaka ‘the new Peter Drucker’ (Teece 2008, p. ix). In the

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mid-1990s, so-called ‘Knowledge Management’ surfed to significance on a *tsunami* of references to Nonaka, Polanyi and tacit knowledge (Ray 2009, pp. 58-61).

Although the flood of interest in Knowledge Management has ebbed, an egregious misrepresentation of Polanyi’s model of tacit knowledge perdures amid the post-diluvium detritus. Specifically, Polanyi’s observation that ‘*we can know more than we can tell*’ has been eclipsed by Nonaka’s claim that tacit knowledge could be converted into ‘explicit knowledge’, depicted as ‘words or numbers that anyone can understand’ (Nonaka and Takeuchi 1995, p. 9). Ostensibly, we could ‘tell what we know’ by converting the ineffable component of tacit knowing into a perfect language that *anyone* could understand and—by implication—no one would misunderstand. But that raises an intractable question: how could anyone either *learn* a perfect language or use it to say anything *new* without raising the possibility of being misunderstood?

Some aspects of the slippery problems that stem from Nonaka’s reinvention of Polanyi have been tackled by Haridimos Tsoukas. With reference to Polanyi’s original work, Tsoukas excoriated Nonaka’s erroneous view of tacit knowledge and lamented its contribution to the ‘Great Misunderstanding’ (Tsoukas 2003, pp. 419-421) of tacit knowledge in management studies. But, in common with Nonaka, Tsoukas ignored the role that faith played in saving Polanyi’s model of tacit knowing from solipsism (Polanyi 1974, p. 316; Mitchell 2006, p. 142). As two of Polanyi’s biographers noted: ‘Some of the most powerful passages [in *Personal Knowledge*] have the ring of St Augustine or Cardinal Newman’ (Wigner and Hodgkin 1977, p. 434). Polanyi blended philosophy with prophetic homily, insisting (with reference to St Augustine) that *belief* was the source of understanding: ‘We must now recognize belief once more as the source of all knowledge’ (Polanyi 1974, p. 266)—‘*I believe*

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that in spite of the hazards involved, I am called upon to search for the truth and state my findings' (Ibid. p. 299, original emphasis) — '*The freedom of the subjective person to do as he pleases is overruled by the freedom of the responsible person to do as he must*' (Ibid. p. 309, original emphasis). *All* knowing is personal,

But this does not make our understanding *subjective*. Comprehension is neither an arbitrary act nor a passive experience, but a responsible act claiming universal validity. Such knowing is indeed *objective* in the sense of establishing contact with a hidden reality (Ibid. p. vii, original emphasis).

Responsible people, Polanyi insisted, seek the truth in a committed and responsible manner. And Polanyi closed *Personal Knowledge* by declaring *his* belief that people have an opportunity to progress towards 'an unthinkable consummation', which is, 'how a Christian is placed when worshipping God' (Ibid. p. 405).

It is faith alone that saves Polanyi's model from solipsism. And, in a world where different people believe in different things, accepting one person's opinion about a mysterious 'hidden reality' is at odds with the construction of intersubjectively viable knowing and learning in the world that we experience. While Polanyi's prophetic homilies may inspire believers, they cannot be judged *rationally*. In rational terms, what Polanyi *believed*—however passionately—is merely *his* opinion. And his call to the faithful is compromised by the candid admission, in *Personal Knowledge*, that he might be mistaken.

The principal purpose of this book is to achieve a frame of mind in which I may hold firmly to what I believe to be true, even though I know that it might conceivably be false (Polanyi 1974, p. 214).

With hindsight, the philosophical ideas that Polanyi developed during the last three decades of his life could be seen as an elaboration of a brief monograph, *Science, Faith and Society* (first published in 1946), where he concluded that 'Knowledge of

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reality and the acceptance of obligations which guide our consciences once firmly realized, will reveal to us God in man and society' (Polanyi 1964, p. 84). In reaching this conclusion, Polanyi suggested that scientists, who are dedicated to 'the service of a particular spiritual reality' (Ibid. p. 65), enact the process of revelation. But Polanyi's efforts to establish a mystical connection between personal knowledge and 'spiritual reality' involve the redefinition of 'truth' and 'reality', together with some idiosyncratic speculations about the 'depth', 'degree' and 'life' of reality—as we will see later.

So, how might we develop the conceptual advantages embodied in Polanyi's model of personal tacit knowing *without* invoking mysticism? Whereas Polanyi related progress in personal tacit knowing to mystical revelation, Ernst von Glasersfeld's radical constructivism offers a coherent model that is not only compatible with rational aspects of tacit knowing, but also uses rational argument to refute the charge of solipsism. The two principles that make radical constructivism 'radical' could be used to distinguish the similarities and differences between Polanyi and von Glasersfeld's models.

- knowledge is not passively received but built up by the cognizing subject;
- the function of cognition is adaptive and serves the organization of the experiential world, not the discovery of ontological reality (Glasersfeld 2002, p. 18).

While the first principle fits with Polanyi's model, the second principle signals von Glasersfeld's steadfast effort to make sense of 'experiential reality' in a coherent and viable manner: there is *no* access to a transcendental truth and *no* supposition that ontological reality 'exists'.

Paradoxically, Polanyi's perspective on personal knowledge has remarkably little to say about 'other people' and the intersubjective processes that shape knowing and learning. His faith-based *fiduciary* principles are limited to those whom you may trust to worship a similar deity in a similar manner. If Polanyi's model of personal knowing relies on a 'vertical' relationship between each person and something supernatural, von Glasersfeld's model is 'horizontal' in the sense that the 'self' and 'others' have to be *constructed* (as opposed to *discovered*) in the course of human experience: it is a theory of *knowing* that has nothing whatever to say about *being*. Although I have no recollection of being born, I am confident that I know my date of birth. But rather than view this personal knowledge as the discovery of transcendental truth, I regard it as something constructed in concert with others. What I know as an individual is enabled and constrained by my interaction with others. And the 'imagined institutions' that mediate this interaction are known in ways that cannot be told.

Whereas the Nobel Laureate, Douglass North, won international acclaim for his definition of institutions as 'the rules of the game' (North 1990, p. 3), my argument is that institutions *cannot* be reduced to rules. Mindful of Benedict Anderson's influential definition of nations as 'imagined communities', I try to relate Polanyi's concept of 'knowing more than we can tell' to the horizontal imagining of the self and others. In Anderson's analysis, a nation is *imagined*: 'because the members of even the smallest nation will never know most of their fellow members, meet them, or even hear them, yet in the minds of each lives the image of their communion' (Anderson 2006, p. 6). And the institutionalisation of trust across any

collective of ‘people like us’ involves imagining others who are more or less similar to us. In extreme cases, people are willing to die for their imagined community and they may accord solemn reverence to cenotaphs and tombs of Unknown Soldiers (Ibid. p. 9). But what reverence would be accorded to the tomb of the Unknown Reductionist?

Tacit Knowing: An Elegant Model?

By claiming that ‘tacit knowledge’ could be converted into ‘explicit knowledge’ expressed in a perfect language, Nonaka reinvented a problem that Polanyi was trying to avoid. In *The Tacit Dimension*, Polanyi attacked modern science’s aim of establishing ‘a strictly detached, objective knowledge’ (Polanyi 1983, p. 20) and, drawing an analogy with Plato’s *Meno*, wrote that, ‘to search for the solution of a problem is an absurdity; for either you know what you are looking for, and then there is no problem; or you do not know what you are looking for, and then you cannot expect to find anything’ (Ibid. p. 22). But problems *are* conceptualised and new things *are* learned: people *can* know more than they can tell.

We can recognise our friend in an instant, but cannot say how we recognised that person as our friend. In Polanyi’s model, personal knowing is the *capacity* to do something that has been learned in the course of experience. Evidence of our capacity ‘to know’ takes the form of Gestalt integrations that pop into consciousness instantly and inexplicably (nobody has a rational model of how consciousness works). And these Gestalt *wholes* integrate unspecifiable *parts*. If we try to reduce the whole to *putative* parts (for example, by speculating about *how* we

recognised our friend), the putative part becomes the new focus our attention—as Polanyi insisted in his last book, *Meaning*, co-authored with Harry Prosch, ‘We can only point to the existence of tacit integration in our experience. We must be forever unable to give it an explicit specification’ (Polanyi and Prosch 1977, p. 62).

Irrespective of whether tacit knowing involves a physical skill or a cognitive performance, we learn in the course of ‘doing things’: learning involves dwelling in the details of a particular activity. Gestalt tacit integrations may hint that we have ‘made progress’—when we become aware of ‘being able’ to ride a bicycle or sense that our attempts to speak a foreign language have been understood—but we cannot ‘see behind’ the Gestalt to articulate what we *might* have learned.

Learning to speak is a gradual process and many thwarted attempts might be required before children feel confident in their use of words. While Gestalt integrations may encourage learners with the sense that they have ‘made progress’, Polanyi’s argued that the ability to ascend to a ‘higher level’ involved a qualitative improvement that could not be derived from ‘laws’ relating to lower level parts (Polanyi 1983, p. 36). No matter how many words you learn, the component parts of a vocabulary do not provide a logical basis for deducing the rules of grammar. Mastery of words and a grammar for arranging those words may support the capacity for linguistically comprehensible expression, but such mastery does not tell the learner what to say. Likewise, developing the capacity to be a witty or stylish speaker cannot be ‘planned’ using language, because the plan would need a plan and we could never break into the loop (Ryle 2000, p. 31). Words are ‘tools’ of expression; but the sense that an expression is meaningful involves Gestalt integrations that cannot be reduced

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to specifiable ‘units of meaning’. If we select a specific word and repeat it incessantly, it becomes meaningless.

Polanyi’s model of tacit knowing conceptualised two mutually dependent, but mutually exclusive, dialectical interaction between ‘focal awareness’ of an integrated whole (something we are *conscious* of knowing at any given instant) and the *subconscious* use of ‘subsidiary awareness’ that is learned in the course of experience. Even when we learn to speak, we can only speak about one thing at a time. While the human brain is capable of astounding feats of *parallel* processing, language is a *linear* affair in which ideas are arranged in a sequence. Learning language—or anything else—involves a *mutually dependent* dialectical interaction between the current subject of focal attention and tacit integration of subsidiary details. Tacit knowing enables us to ‘look through’ (Polanyi 1974, p. 116) words to meanings that are shaped by irreducible Gestalt integrations of unspecified subsidiary particulars that have been learned, but cannot be told. We cannot be conscious of the process by which we are conscious. Or, as Polanyi suggested, ‘You cannot use your spectacles to scrutinize your spectacles’ (Polanyi and Prosch 1977, p. 37). When spectacles are used as a subsidiary ‘tool of seeing’, the subject looks through his or her spectacles to focus on the object of attention. Removing the spectacles and making them the focal point of attention implies that whatever was previously seen has gone out of focus. Knowing how to ‘do things’ cannot be reduced to language or any other putative ‘part’ that allegedly ‘explains’ performance.

We can laugh before we can make any sense of why the joke is funny; the competent driver can initiate an emergency stop as much 0.5 seconds before he or she

is conscious of seeing the child run in front of the car (see Nørretranders 1999, 'The Half Second Delay', pp. 213-250). A competent driver attends to the road ahead and uses the car's controls in a subsidiary manner, although such an accomplishment seems to have eluded Polanyi. Despite his exceptional achievements in other areas, Polanyi's family and friends were merciless in denouncing him as an incompetent driver: the famous economist, John Jewkes, once insisted on walking in the rain rather than board a car with Polanyi at the wheel (Scott and Moleski 2005, pp. 145-146). The competent use of tools—whether they be words as 'tools of sensemaking' or cars as 'tools of transport'—implies that the knower can wield the tool in a subsidiary manner while attending to the focal task. If we pay inappropriate attention to the tools, skilled performance can suffer. If we focus on how we hold the hammer, hitting the nail may be painful.

The expectation that we could know *how* and *why* 'we do what we do' or 'think what we think' and somehow take charge of our 'voluntary actions' is misleading, as contemporary thinkers such as Sabine Maasen and her colleagues have demonstrated (Maasen, Prinz and Roth 2003; Maasen and Sutter 2007). Polanyi's conceptualisation of the tacit dimension 'makes space' for 'what we know but cannot tell' in a way that avoids the logical impossibility of objective access to 'self-knowledge' (Hall 1979). What we know explicitly cannot be divorced from its tacit coefficient. Ultimately, the human capacity to know is tacit.

All knowledge falls into one of these two classes: it is either tacit or rooted in tacit knowledge.

The ideal of a strictly explicit knowledge is indeed self-contradictory; deprived of their tacit coefficients, all spoken words, all formulae, all maps and graphs, are strictly meaningless. An exact mathematical theory means nothing unless we recognize an inexact non-mathematical knowledge on which it bears and a person whose judgment upholds this bearing.

The false ideal of a strictly explicit knowledge was pursued with the greatest zeal in the twentieth century by modern positivism (Polanyi 1969b, p. 195).

Short of a brain transplant, tacit knowledge cannot be removed from the heads of persons. Or, to be more precise, tacit knowing cannot be removed from the brain in which it was learned. Unlike any other organ transplant, brain transplants would favour the donor. If my brain were transplanted into a better body, I would have a better tool of knowing. If I were able to buy a better car, I would have a better tool of transport. But, in both cases, the tacit capacity to use these new tools in a potentially incompetent manner would be entirely my own. Contrary to Nonaka's claim, words and numbers—the tools of language—cannot stand in place of the tacit capacity to use those tools. Strictly explicit knowledge *is* strictly meaningless—the epistemological equivalent of a brainless corpse.

In Nonaka's model, tacit knowledge 'contains' a cognitive dimension, where something akin to a 'private language' allows 'self-knowledge' to be constructed in ways that cannot be explained to the knowing subject. Moreover, the inaccessible cognitive dimension is pronounced capable of precise functions, such as 'reflecting reality' and 'making plans'. As Nonaka and Takeuchi (1995, p. 8) argued in *The Knowledge-Creating Company*: 'tacit knowledge contains an important cognitive dimension. [...] The cognitive dimension of tacit knowledge reflects our image of reality (what is) and our vision for the future (what ought to be)'. On this account, the model resembles Cartesian dualism's notion of a 'private self' that is 'somehow' connected to an insensate body. While the body perceives the world, an introspectionist ghostly 'self' does the body's thinking in a perfect and private language that is not only untellable to others, but also intelligible to the speaker.

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Nonaka's unvarnished claim is that: 'To convert tacit knowledge into explicit knowledge means finding a way to express the inexpressible' (Nonaka 1991, p. 99), which involves finding a way to objectify the tacit dimension and thereby create explicit knowledge objects. Hence, what the thinking self knows is converted into an object that exists among other objects. Universally comprehensible explicit knowledge is somehow created from the person's inexpressible perfect and private language of tacit 'cognition'. Miraculously, the ghostly private self's ineffable cognition is converted into words and numbers that anyone could understand. Inexplicably, the inexpressible becomes universally comprehensible as the ghostly self is exorcised and the thinking self is reduced to explicit knowledge. And, in a blinding flash of casuistry, the problems of introspection are converted into a behaviourist 'solution'. Indeed, we could be reminded of Gilbert Ryle's behaviourist attack on 'the dogma of the Ghost in the Machine', where he denounced 'with deliberate abusiveness' any notion of a ghostly self that inhabits an insensate body (Ryle 2000 p. 17). Instead, mind and body comprise an integrated entity that merely responds to sense perceptions: there is no personal capacity to know love, pain or anything else that cannot be observed 'objectively'.

Although many in the West regard the introspectionist and behaviourist positions as an awkward dilemma between two mutually exclusive and untenable alternatives (Hall 1979), Nonaka and Takeuchi (1995, p. 239) simply declare that, in Japan, the synthesis of 'two seemingly opposing concepts [...] body and mind' is easier than in the West. While this nihilistic dismissal of Western scholarship may be eye-catching, the associated assumption of linguistic perfection (whether in the ghostly self of private tacit cognition or the behaviorism's mind-body object)

recreates the *Meno*'s paradox, which Polanyi avoided with striking elegance. But that elegance could be seen as compromised by the question of whom you can trust.

Polanyi's Stairway to Transcendental Truth

The difficulty with Polanyi's fiduciary framework is that it relies on faith in transcendent truth: unless you believe, you cannot understand. In Nonaka's model, truth, like beauty, is 'in the eye of the beholder' (Nonaka, Toyama and Konno 2000, p. 7). While the brisk brio of Nonaka's extreme relativism avoids the mystical dimension of Polanyi's claim about metaphysical truth, it simultaneously denies the only thing that saved Polanyi's model from solipsism. Some may be reminded of G. K. Chesterton's concern about people who lose their faith in God: it is not so much that they will believe in *nothing* that is a problem, rather it is that they will believe in *anything* (see Blackburn 2005, p. xiv). Thus, nothing would stand between Nonaka's nostrums, astrology and the accounts of those who were once abducted by aliens. The issue turns on whom or what you trust.

For Polanyi, vertical trust was a matter of faith in abstract absolutes, such as 'truth', 'liberty' and 'freedom'. But how is a faithful knower supposed to relate abstract absolutes to transitive uses of the verb 'to do'? What should be done in the name of faith? A good school might have 'truth' cast in stone above its gate or woven into its crest or motto, but only *people* have the power to say what should be taught as true. Or, to make a similar point with a different example, George W. Bush's decision to declare a 'War on Terror' raises the awkward question of how the abstract noun

‘terror’ should be attacked. Does attacking terror justify *doing* ‘terrible’ or ‘terrifying’ things? And what would constitute the defeat of ‘terror’?

In Heinz von Foerster’s consummately precise epigram: ‘Objectivity is the delusion that observations could be made without an observer’ (quoted in Glasersfeld 2007c, p. 135). It is the view of a ‘no one’ who is ‘no where’: a ‘God’s eye’ perspective. You cannot see, hear, smell, taste or feel objectivity: such sensations are *subjective* and, perforce, involve an observer—which is essential to Polanyi’s model of personal tacit knowing. The process of observation, or any other purposeful activity, depends on the skilled performance of people: it is the personal capacity to know, which is learned—tacitly—by each individual knower. In a world without people, nothing could be known. At the same time, Polanyi invoked faith to claim a connection between personal knowing and *alleged* contact with an *alleged* reality: ‘I declare myself committed to the belief in an external reality gradually accessible to knowing’ (Polanyi 1969a, p. 133)—‘If all men were exterminated this would not affect laws of inanimate nature’ (Polanyi 1969c, p. 225). Knowers have to believe in what they cannot experience.

In his short monograph, *The Study of Man*, Polanyi pronounced that: ‘In an ideal free society each person would have perfect access to the truth: to the truth in science, in art, religion and justice, both in public and private life’ (Polanyi 1959, p. 68). Meanwhile, the thundering prophetic rhetoric of *Personal Knowledge* underscored Polanyi’s faith in the personal *discovery* of knowledge, as opposed to constructing the personal capacity ‘to know’.

... personal knowledge in science is not made but discovered, and as such it claims to establish contact with reality beyond the clues on which it relies. It commits us, passionately

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and far beyond our comprehension, to a vision of reality. Of this responsibility we cannot divest ourselves by setting up objective criteria of verifiability—or falsifiability, or testability, or what you will. For we live in it as in the garment of our own skin. Like love, to which it is akin, this commitment is a ‘shirt of flame’, blazing with passion and, also like love, consumed by a universal demand (Polanyi 1974, p. 64).

Scientists *discover* by dwelling in the details of their research and ‘seeing’ new possibilities through the tacit integration of unspecified subsidiary details. The pursuit of a ‘universal demand’ involved a responsible commitment to Polanyi’s moral ideals: it implied passion analogous to love that blazed like a ‘shirt of flame’. In Polanyi’s view, all people have ‘moral passions’ but only some people (those who happen to agree with Polanyi) have ‘moral ideals’ (see Najder 1968, p. 367). Writing in *The Logic of Liberty*, first published in 1951, Polanyi dismissed those with whom he disagreed, such as Nazis, as having their morals ‘upside down’.

The Nazi disbelieves in public morality in the way we disbelieve in witchcraft. It is not that he has never heard of it, but that he thinks he has valid grounds to assert that such a thing cannot exist. If you tell him the contrary, he will think you peculiarly old-fashioned, or simply dishonest.

In such men, the traditional forms for holding moral ideals had been shattered and their moral passions diverted into the only channels which a strictly mechanistic conception of man and society left open to them. We may describe this as a process of *moral inversion* (Polanyi 1998, p. 131).

Rather than seeking to make sense of *how* expectations evolve in ways that shape the legitimacy of different practices in different contexts, Polanyi asserted that the absolute values *he* worshipped were ‘true’—subject to the aforementioned caveat in *Personal Knowledge* that what *he* believed to be true ‘might conceivably be false’. And, with a further twist of his mystical kaleidoscope, Polanyi asserted that ascending to higher levels of understanding involved a reinterpretation of ‘truth’ and ‘reality’.

For Polanyi: ‘The ideal of an impersonally detached truth would have to be reinterpreted, to allow for the inherently personal character of the act by which truth is declared’ (Polanyi 1974, p. 71). Responsible and committed people (such as accredited scientists) who are passionate about ‘appropriate’ moral ideals might be seen as trusted collaborators in the discovery of the truth about reality—which, in Polanyi’s prophecy, had mysterious qualities such as ‘depth’ and ‘life’.

In a new introduction written for the second edition of *Science, Faith and Society*, Polanyi offered a novel definition of ‘real’ and its implications for tacit knowing:

Real is that which is expected to reveal itself indeterminately in the future. Hence an explicit statement can bear on reality only by virtue of the tacit coefficient associated with it. This conception of reality and of the tacit knowing of reality underlies all my writings (Polanyi 1964, p. 10).

This idea that reality revealed itself in different ways created the conceptual space to discover more about something that had already been ‘discovered’ (for example, when Einstein’s theories clashed with Newton’s theories). In Polanyi’s model, additional discovery plumbed the ‘depths’ of reality: deeper reality was a function of ‘significance’. Because people and problems are likely to be associated with unexpected discoveries in the future, they are *more* significant and therefore *more* real than cobblestones.

The structural kinship between knowing a person and discovering a problem, and the alignment of both with our knowing of a cobblestone, call attention to the greater depth of a person and a problem, as compared with the lesser profundity of a cobblestone. Persons and problems are felt to be more profound, because we expect them yet to reveal themselves in unexpected ways in the future, while cobblestones evoke no such expectation. This capacity of a thing to reveal itself in unexpected ways in the future I attribute to the fact that the thing observed is an aspect of a reality, possessing a significance that is not exhausted by our conception of any single aspect of it. To trust that a thing we know is real is, in this sense, to feel that it has the independence and power for manifesting itself in yet unthought of ways in the future. I shall say, accordingly, that minds and problems possess a deeper reality than cobblestones, although cobblestones are admittedly more real in the sense of being tangible.

And since I regard the significance of a thing as more important than its tangibility, I shall say that minds and problems are more real than cobblestones (Polanyi 1983, pp. 32-33).

But why should *we* trust Polanyi's mystical musings about relative 'realness'? In his valedictory book, *Meaning*, Polanyi indicated that: 'we call "real" any meaningful entity that we expect to reveal itself in the future, we think of it as something that has a "life" of its own, so to speak' (Polanyi and Prosch 1977, p. 66). While Polanyian scholars pour over the implications of Polanyi's faith in the 'life' of cobblestones and any other entities presumed more or less 'real', such mystical speculation is not commensurate with the rational construction of intersubjectively viable reality. Whereas Polanyi worshipped the possibility of personal knowing ascending to 'an unthinkable consummation', in the manner of a Christian 'worshipping God', radical constructivism confines itself to the world that we experience—which is only one we can know rationally.

Radical Constructivism

In common with Polanyi, von Glasersfeld grew up speaking several different languages and both thinkers thought about learning with regard to the work of Jean Piaget. But von Glasersfeld was particularly assiduous, devoting a decade to studying Piaget's work (Glasersfeld 2007b, p. 91). While von Glasersfeld was convinced that Piaget's concept of constructivism was useful and innovative, it was disseminated in a colossal canon, developed over more than 60 years, which seemed to defy coherent interpretation: 'Even the best-intentioned reader is sometimes reduced to a state of exhausted despondence' (Glasersfeld 1982, p. 612). Seemingly, some knowledgeable Piagetians suggested that von Glasersfeld went beyond what Piaget had intended when he spoke of 'constructivism', which was one of the reasons why von

Glaserfeld decided to call his version of constructivism ‘radical’ (Glaserfeld 2007b, p. 91).

Radical constructivism insists that knowledge (no matter how it is defined) is in the heads of persons and the knowing subject has no alternative other than to construct what he or she knows using his or her experience (Glaserfeld 2002, p. 1). Personal knowledge is constructed gradually, as the mind makes sense of experience—thereby echoing what Piaget wrote in 1937: ‘Intelligence organizes the world by organizing itself’ (quoted in Glaserfeld 2007a, p. 9). But intelligence cannot organise itself in any way it pleases: there are *constraints*, as we find whenever the world we experience differs from the world that we would like or expect. A newborn infant starts life without any idea of the difference between the interior and exterior world: the distinction between biting itself and biting its pillow has to be learned (Glaserfeld 2006, p. 4). Observations suggest that, in their early stages of development, infants are inclined to treat everything that moves as if it were alive, until they learn to distinguish between the movement of a jumping frog and clouds that move across the sky. Gradually, children learn to differentiate between movement in general and the movement of birds, animals, fish and so on. Crucially, they learn to identify other human beings as something similar to themselves.

Although ‘normal’ children may appear to learn their language skills without noticeable effort, many perturbations occur before the learner is able to use words in ways that ‘work’. A child who grows up in a world where every apple is red might be surprised when a visitor brings a green fruit and calls it an apple. In time, ‘social pressure’ in the child’s world, may urge him or her to accept that apples come in

different colours (Glaserfeld 2002, p. 92). As the learner progresses, words become tools for reflection, abstraction and generalisation (Ibid. pp. 90-93). Strangers who say surprising things can be questioned, while talk about ‘apple pie order’ or visiting the ‘Big Apple’—New York—or seeing someone as the ‘apple’ of your eye may be conducted without worrying whether the apple in question is red or green. Insiders, in any ‘community of interaction’ learn without being conscious of what and how they are learning. Unspoken expectations enable and constrain their behaviour in ways that are known—tacitly—in ways that cannot be told. On this account, radical constructivism provides a horizontal alternative to Polanyi’s vertical ascent to the truth.

Arguably, radical constructivism shares the virtues of Polanyi’s focal-subsidary model, while avoiding Polanyi’s metaphysical restrictions. Certainly, an aside tucked away in one of von Glasersfeld’s footnotes suggests that the focal-subsidary part of Polanyi’s model *is* compatible with radical constructivism,

While you are reading this, there are innumerable signals available to you to which you are not attending; e.g., some that you would call ‘tactual’ that originate in your rump and which you could interpret as telling you that you are sitting; others that originate in your ears and which you could interpret as telling you that a car is passing in the street; but your attention was focused on this text and therefore you were not doing any of this other interpreting before I mentioned the possibility. Similarly, literally millions of signals are constantly generated in the retinas of your eyes, but you disregard almost all of them because you are focusing your attention on ‘some specific thing’, a coordination of signals that is of interest and ‘makes sense’ to you at the moment (Glaserfeld 2002, p. 75n).

We can only attend to ‘some specific thing’ at any ‘moment’. It is not possible to attend to ‘everything at once’. We can use language—subjectively—as a tool for asking: ‘how we experience our self’ (Glaserfeld 2002, p. 123). As Wolfgang Prinz has argued, we know about our actions: ‘by way of ordinary perception’ (Prinz 2003, p. 31). While the Gestalt perception that language is meaningful is shaped by the ‘representation’ (Glaserfeld 2002, pp. 59-60) of things that we have learned in the

course of our experience, we cannot ‘see through’ the Gestalt whole to specify the parts of experience that are being re-presented.

Learning language is fundamental to making sense of our experience and constructing ‘experiential reality’. In von Glasersfeld’s model, experiential reality has to be constructed: ‘bit by bit in a succession of steps that, in retrospect, seem to form a succession of levels’—and this relies on repetition: ‘Without repetition there would be no reason to claim that a given item has any permanence beyond the context of present experience’ (Glasersfeld 2002, p. 118). We need repeatable experiences to convince ourselves that something we have constructed as ‘real’ will perdure when our focal attention is directed elsewhere. Gradually, we construct and refine our sense of a fully furnished independent world that perdures irrespective of whether we experience its furniture (Glasersfeld 2002, p. 119).

Amid the human interaction that shapes language and intersubjectively viable sensemaking, we seek to arrange experiential reality in reliable ways. In this respect, *science* could be seen as a remarkably effective way of arranging experience to produce reliable predictions; but it is *not* qualitatively different to everyday thinking. For Albert Einstein: ‘The whole of science is nothing more than a refinement of everyday thinking. [...] even the concept of the “real external world” of everyday thinking rests exclusively on sense impressions’ (Einstein 1982, p. 290). Similarly, Werner Heisenberg commented that: ‘The deeper the scientist looks, the more he sees himself’ (quoted in Glasersfeld 2006, p. 3). Building on Humberto Maturana’s view of the ‘scientific method’, von Glasersfeld (2002, pp. 116-117) demonstrated that a viable account of what scientists *do* (when they ‘do science’) can be constructed

without invoking the discovery of ontological reality. In practice, scientists: (1) specify the constraints under which a phenomenon is observed; (2) propose an explanation of interesting or surprising aspects of the phenomenon; (3) produce predictions; and (4) generate conditions that should lead to the observation of the predicted phenomenon. What matters is how scientists use their experience to make sense of what is ‘seen’ in the course of ‘doing science’.

Imagined Institutions

Since it first appeared in 1983, Benedict Anderson’s book, *Imagined Communities*, has been published in 33 countries, translated into 29 languages and sold more than 250,000 copies. In new material produced for the 2006 edition, Anderson indicated that the reinvention of *Imagined Communities* in different languages had separated him from the ideas: it ‘is not my book anymore’ (Anderson 2006, p. 229). At the risk of adding to Anderson’s disquiet, I have appropriated the concept of ‘imagined community’ as a convenient vehicle for illustrating the horizontal ‘tacit’ component of intersubjectively viable knowing and learning; albeit with an unambiguous emphasis on ‘the imagined as tacit’, which goes beyond Anderson’s use of the term. For Anderson, ‘all communities larger than primordial villages of face-to-face contact (and perhaps even these) are imagined’ (Anderson 2006, p. 6). In my analysis, *all* communities *are* imagined—tacitly—in the sense that interaction *within* and *among* them is shaped by what is known, but cannot be told.

While meddling with a metaphor’s vehicle can confuse its tenor, my metaphorical use of ‘vertical’ and ‘horizontal’ (to distinguish between Polanyi’s faith-

based discovery and von Glasersfeld's intersubjective construction of knowledge) bears a strong family resemblance to Anderson's use of the vertical-horizontal distinction. Specifically, Anderson contrasted vertical hierarchies that descended from divine religious authority with the horizontal dimension of nations as political communities that are imagined as both inherently *limited* (even the largest nation has boundaries) and *sovereign*. The concept of a nation was born in an age when 'Enlightenment and Revolution were destroying the legitimacy of the divinely-ordained, hierarchical dynastic realm' (Anderson 2006, p. 7). In traditional religious communities, faith-based hierarchies transmitted divine authority to ordinary people. The few—at the apex of their respective hierarchies—who could read sacred religious scripts, articulated divine authority in an era when: 'the fundamental conceptions about "social groups" were centripetal and hierarchical, rather than boundary-oriented and horizontal' (Ibid. p. 15).

Both 'top-down' divine authority, which *tells* people what they should know, and Polanyi's 'bottom-up' *discovery* of divine truth, involve a personal connection with the divine: a vertical relationship with something supernatural. In contrast, a nation is imagined as a horizontal community because:

... regardless of the actual inequality and exploitation that may prevail in each, the nation is always conceived as a deep, horizontal comradeship. Ultimately it is this fraternity that makes it possible, over the past two centuries, for so many millions of people, not so much to kill, as willingly to die for such limited imaginings (Ibid. p. 7).

Given the social taboo against incest, 'fraternity' provides a potent metaphor for the non-sexual love that unites people in a willingness to kill and die for what they imagine their nation symbolises. Power mediated by ineffable imagining may be implied by the solemn respect accorded to cenotaphs and tombs of Unknown Soldiers.

The imagined institutions of imagined communities legitimise supreme sacrifice in

ineffable ways. Although those who pay conscious attention to their consciences (such as ‘conscientious objectors’) may consider such deaths unreasonable, the tacit power of ineffable emotion could cause the conscientious to be branded ‘traitors’.

While our focal sense of imagined institutions *cannot* be reduced to subsidiary parts, Douglass North took the view that human institutions *could* be reduced to ‘the rules of the game’. He has argued that, throughout human history, institutions have created order and reduced uncertainty in exchange (North 1991, p. 97). For North, institutions include *informal constraints* (sanctions, taboos, customs, traditions and codes of conduct) and *formal rules* (such as constitutions, laws, and property rights). Furthermore, the formal is essentially the *same* as the informal: the difference is merely one of degree.

The difference between informal and formal constraints is one of degree. Envision a continuum from taboos, customs, and traditions at one end to written constitutions at the other. The move, lengthy and uneven, from unwritten traditions and customs to written laws has been unidirectional as we have moved from less to more complex societies and is clearly related to the increasing specialization and division of labor associated with more complex societies (North 1990, p. 46).

But can the formal be regarded as a logical, linear and inevitable extension of the informal? Could we not opine that North’s ‘degrees of essence’ echo the difficulties associated with Nonaka’s claim that tacit knowledge could be ‘converted’ into explicit knowledge?

Although an appreciation of power mediated by unspoken expectations—which could be called ‘informal constraints’—in Japan’s ‘company as family’ organisations is vital to making sense of Japanese management (Ray and Clegg 2007; Ray 2008), Nonaka’s extravagant claim that the ineffable could be articulated overlooks *inter alia* the power of what is *not* said. Close-knit community relationships

in Japanese organisations make it easy to ostracise those who do not comply with unspoken expectations. And those who do the ostracising cannot be wholly explicit about what they expect; *they can expect more than they can tell*. Yet, Japan is the world's second largest economy and China—where considerable power mediated by informal relationships, rather than written laws, influences what happens—is home to the biggest economic boom in global history.

In an era when the so-called Knowledge Economy relies on Knowledge Workers who are paid to 'think for themselves', knowing whom you can trust to act on your behalf depends on knowing the person—informally. Getting to know people to the point where you are able to anticipate how they might act and think may avoid the need for endless instructions. Trusted agents can be relied upon to 'do the right thing', Japanese-style, without being told to do anything. So, is North's willingness to 'worship' the inevitability of *divided* labour and formal rules warranted? On what basis is his faith in a deterministic model—involving a *unidirectional* move to written laws—justified? Are we condemned to what George Ritzer (2004a; Ritzer 2004b) has characterised as a 'McDonaldized' world where the 'imperial' expansion of centrally conceived command-and-control rule-based bureaucracies exploit standardisation and economies of scale to surpass national boundaries by selling standardised products and services across the globe?

In contrast to McDonaldization's emphasis on doing what is already known more *efficiently*, innovation involves *flexibility*, as people grapple with uncertainty in the pursuit of anticipated advantages. The capacity to learn in concert with others can place a premium on empathetic 'listening', rather than bureaucratic 'telling'.

Conceivably, an organisation's capacity to learn and flourish in the face of social complexity is not an indication of its love of rules, but an echo of its capacity to build on intersubjectively viable communication as colleagues who 'know more than they can tell' cooperate in the quest for competitive advantage.

While North's later work has a distinctly constructivist flavour, it blends a constructed model of 'economic change' with faith in the discovery of a physical world, according to the logic of reductionism.

The key to building a foundation to understand the process of economic change is beliefs—both those held by individuals and shared beliefs that form belief systems. The explanation is straightforward; the world we have constructed and are trying to understand is a construction of the human mind. It has no independent existence outside the human mind; thus our understanding is unlike that in the physical sciences, which can employ reductionism to understand, and expand comprehension of, the physical world. Physical scientists, when they seek a greater understanding of some puzzle in the physical world, can build from the fundamental unit of their science to explore the dimension of the problem they seek to comprehend (North 2005, p. 83).

Whereas the younger North asserted that progress towards formal rules was 'unidirectional', the new North's hybrid model asserts that belief in economic matters is 'unlike' understanding in the physical sciences. From a radical constructivist perspective, it is entirely reasonable to propose that the construction of economics has 'no independent existence outside the human mind', but it is unreasonable to assume that this is *unlike* understanding in the physical sciences. As the previous section's quotations from Einstein and Heisenberg indicated, the capacity of celebrated scientists to 'see' scope for scientific progress is shaped by what they have learned in the course of their experience. Making sense of science is *not* qualitatively different from making sense of any other aspect of experience. Without a God's-eye view of what lies outside human experience, *all* human knowing is a construction of the

human mind. And North cannot claim otherwise without invoking a *mystical* insight into what humans cannot experience.

Conclusion

This paper has tried to rethink Polanyi's vertical model of personal tacit knowing with regard to the horizontal processes by which intersubjectively viable knowing and learning emerge from human interaction. While there is much of merit in Polanyi's original model, Nonaka's reinvention of tacit knowledge has destroyed those merits and ignored the model's metaphysical restrictions. Polanyi's concept of tacit knowing could be seen as a major step in countering the problems of sheer objectivity, together with the logical impossibility of a perfect language. But Nonaka stepped in a different direction and recreated problems that Polanyi managed to avoid.

Whereas Polanyi saw strictly explicit knowledge as 'strictly meaningless', Nonaka asserted that explicit knowledge—expressed in a universally comprehensible language—could be synthesised from the ineffable tacit capacity 'to know'. Despite an insouciant disregard for the conventions of rational debate about introspectionist and behaviourist perspectives on privileged access to self-knowledge, Nonaka's lubricious logic has been strikingly successful in seducing gullible gatekeepers of Western social science. In the peculiar world of management studies, gurus and their apparatchiks have heralded Nonaka's solecisms as a way of making the problem of 'tacit knowledge' accessible to busy managers and others who do not have the time to explore the concept's philosophical provenance. And it would be churlish to deny the immense scale of Nonaka's influence. Although Tsoukas drew attention to Nonaka's

palpable misrepresentation of Polanyi's concept of tacit knowing, he appeared unmoved by the implications of Nonaka's nihilistic approach to transcendental truth. In flagrant opposition to the essence of Polanyi's fiduciary framework, Nonaka and his colleagues have claimed that truth is 'in the eye of the beholder': it is merely a matter of personal preference—which begs questions about solipsism and institutionalisation of trust. Neither Polanyi's mysticism nor Nonaka's nihilism are compatible with the intersubjectively viable construction of rational debate.

Radical constructivism seeks to delimit the construction of rational thought 'in here'—that is to say, in the brains of persons—from the discovery of mystical truth 'out there'. Although Piaget's influence is evident in both Polanyi and von Glasersfeld's work, Polanyi's faith in abstract absolutes involved a Manichean distinction between *moral ideals* and *moral inversion*. Of course, speculation about what might be 'out there' can be vital to the processes by which human beings pacify their souls; but mysticism, which is embodied in the heritage of religions and everything that is mysterious in the sphere of art, transcends rational debate. It is *qualitatively* different. Mystical and rational perspectives cannot be unified in a monist whole. As a scientist, Polanyi might have opposed the teaching of creationism to school children, but those who support creationism could dismiss Polanyi's position as 'morally inverted' and discussion could not progress beyond a clash of irreducible emotions. Faith in either objectivity or creationism involves mystical speculation about what is outside experience. Neither position is compatible with rational debate.

Rational interaction with others involves conceding an intersubjective reality. The sense that we make of communication with other people has to be more or less compatible with ‘the world as they see it’. Children are born ‘knowing more than they can tell’, but mastering the ability to speak does not enable them to ‘tell what they know’. While language cannot stand in place of what the knower knows, it can be used as a tool for constructing intersubjectively viable accounts of experiential reality—including the precise and reliable predictions developed by scientists. Without intersubjectively viable communication with others, I could not construct myself as ‘me’. And I could not ask how I perceive myself. While the construction of *my* Gestalt perceptions of me differs from *other people’s* Gestalt perceptions of me, without others there would be no me. Moreover, no one’s Gestalt perception can be *reduced* to its putative parts: knowing is always more than telling.

I have no recollection of what happened before I learned to speak and could not comment, objectively, on how trust shaped my knowing and learning. As the subject—not the object—of my experience, I could never be objective about the putative ‘parts’ of trust that may shape my capacity to act and think. Nor could I claim privileged access to a ‘private self’ that commands and controls my ‘voluntary actions’. Contrary to North’s model of institutions, I could never be wholly explicit about putative ‘rules’ that shape my actions and thoughts. I know such things in ways I cannot tell: the power of *institutions* to shape my capacity to know and learn is *imagined*.

References

- Anderson, Benedict. 2006. *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (Revised Edition). London: Verso.
- Blackburn, Simon. 2005. *Truth: A Guide for the Perplexed*. London: Penguin.
- Einstein, Albert. 1982. Physics and Reality. In *Ideas and Opinions*, Albert Einstein, 290-322. New York, NY: Three Rivers.
- Glaserfeld, Ernst von. 1982. An Interpretation of Piaget's Constructivism. *Revue Internationale de Philosophie* 36(4): 612-635.
- Glaserfeld, Ernst von. 2002. *Radical Constructivism: A Way of Knowing and Learning*. London: RoutledgeFalmer.
- Glaserfeld, Ernst von. 2006: You have to be two to start: rational thoughts about love. *Constructivist Foundations* 2(1): 1-5.
- Glaserfeld, Ernst von. 2007a. Learning as a Constructive Activity. In *Key Works in Radical Constructivism: Ernst von Glasersfeld*, ed. Marie Larochelle, 3-19. Rotterdam: Sense Publishers.
- Glaserfeld, Ernst von. 2007b. Aspects of Constructivism: Vico, Berkeley and Piaget. In *Key Works in Radical Constructivism: Ernst von Glasersfeld*, ed. Marie Larochelle, 91-99. Rotterdam: Sense Publishers.
- Glaserfeld, Ernst von. 2007c. Farewell to Objectivity. In *Key Works in Radical Constructivism: Ernst von Glasersfeld*, ed. Marie Larochelle, 135-142. Rotterdam: Sense Publishers.
- Hall, Ronald. 1979. Wittgenstein and Polanyi: The Problem of Privileged Self-Knowledge. *Philosophy Today* 23(3): 267-278.

- Langford, Thomas and William Poteat. 1968. Upon First Sitting Down to Read *Personal Knowledge: An Introduction*. In *Intellect and Hope: Essays in the Thought of Michael Polanyi*, eds. Langford and Poteat, 3-18. Durham, NC: Duke University Press.
- Maasen, Sabine, Wolfgang Prinz and Gerhard Roth. 2003. *Voluntary Action: Brains, Minds and Sociality*. Oxford: Oxford University Press.
- Maasen, Sabine and Barbara Sutter. 2007. *On Willing Selves: Neoliberal Politics vis-à-vis the Neuroscientific Challenge*. Basingstoke: Palgrave Macmillan.
- Mitchell, Mark. 2006. *Michael Polanyi: The Art of Knowing*. Wilmington, DE: ISI Books.
- Najder, Zdzislaw. 1968. "Moral inversion"—or moral revaluation?' In *Intellect and Hope: Essays in the Thought of Michael Polanyi*, eds. Langford and Poteat, 364-385. Durham, NC: Duke University Press.
- Nonaka, Ikujiro. 1991. The Knowledge-Creating Company. *Harvard Business Review* Nov-Dec 1991: 96-104.
- Nonaka, Ikujiro and Hirotaka Takeuchi. 1995. *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford: Oxford University Press.
- Nonaka, Ikujiro, Ryoko Toyama and Noboru Konno. 2000. SECI, *Ba* and Leadership: A Unified Model of Dynamic Knowledge Creation. *Long Range Planning* 33: 5-34.
- Nonaka, Ikujiro, Ryoko Toyama and Toru Hirata. 2008. *Managing Flow: A Process Theory of the Knowledge-Based Firm*. Basingstoke: Palgrave Macmillan.
- Nørretranders, Tor. 1999. *The User Illusion: Cutting Consciousness Down to Size*. London: Penguin Books.

North, Douglass. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.

North, Douglass. 1991. Institutions. *Journal of Economic Perspectives* 5(1): 97-112.

North, Douglass. 2005. *Understanding the Process of Economic Change*. Princeton: Princeton University Press.

Oakeshott, Michael. 1958. The Human Coefficient, *Encounter* 11(3): 77-80.

Prinz, Wolfgang. 2003. How Do We Know About Our Own Actions? In *Voluntary Action: Brains, Minds and Sociality*, eds. Maasen, Sabine, Wolfgang Prinz and Gerhard Roth, 21-33. Oxford: Oxford University Press.

Polanyi, Michael. 1959. *The Study of Man*. Chicago, IL: University of Chicago Press, 1959.

Polanyi, Michael. 1962. The Republic of Science: Its Political and Economic Theory, *Minerva* 1(1): 54-73.

Polanyi, Michael. 1964. *Science, Faith and Society*. Chicago, IL: University of Chicago Press.

Polanyi, Michael. 1967. The Growth of Science in Society. *Minerva* 5(4): 533-545.

Polanyi, Michael, 1969a. Knowing and Being. In *Knowing and Being: Essays by Michael Polanyi*, ed. Marjorie Grene, 123-137. Chicago, IL: University of Chicago Press.

Polanyi, Michael, 1969b. Sense-Giving and Sense-Reading. In *Knowing and Being: Essays by Michael Polanyi*, ed. Marjorie Grene, 181-207. Chicago, IL: University of Chicago Press.

Polanyi, Michael, 1969c. Life's Irreducible Structure. In *Knowing and Being: Essays by Michael Polanyi*, ed. Marjorie Grene, 225-239. Chicago, IL: University of Chicago Press.

Polanyi, Michael. 1974. *Personal Knowledge: Towards a Post-Critical Philosophy*. Chicago, IL: University of Chicago Press.

Polanyi, Michael. 1983. *The Tacit Dimension*. Gloucester, MA: Peter Smith.

Polanyi, Michael. 1998. *The Logic of Liberty*. Indianapolis, IN: Liberty Fund.

Polanyi, Michael and Harry Prosch. 1977. *Meaning*. Chicago, IL: University of Chicago Press.

Prosch, Harry. 1986. *Michael Polanyi: A Critical Exposition*. Albany, NY: SUNY.

Ray, Tim. 2008. Japanese Management. In *International Encyclopedia of Organization Studies*, eds. Stewart Clegg and James Bailey, 731-5. Thousand Oaks, CA: Sage.

Ray, Tim. 2009. What Does Knowledge Work Do? In *The Sage Handbook of Organizational Behaviour, Volume 2: Macro Approaches*, eds. Stewart Clegg and Cary Cooper, 53-67. London: Sage.

Ray, Tim and Stewart Clegg. 2007. Can We Make Sense of Knowledge Management's Tangible Rainbow? A Radical Constructivist Alternative'. *Prometheus* 25(2): 161-185.

Ryle, Gilbert. 2000. *The Concept of Mind*. London: Penguin.

Scott, William Taussig and Martin Moleski. 2005. *Michael Polanyi: Scientist and Philosopher*. Oxford: Oxford University Press.

- Teece, David. 2008. Foreword. In *Managing Flow: A Process Theory of the Knowledge-Based Firm*, Ikujiro Nonaka, Ryoko Toyama and Toru Hirata, ix-xix. Basingstoke: Palgrave Macmillan.
- Tsoukas, Haridimos. 20003. Do We Really Understand Tacit Knowledge? In *The Blackwell Handbook of Organizational Learning and Knowledge Management*, eds. Mark Easterby-Smith and Marjorie Lyles, 410-427. Malden, MA: Blackwell.
- Takeuchi, Hirotaka and Ikujiro Nonaka. 2004. *Hitotsubashi on Knowledge Management*. Singapore: Wiley.
- Ritzer, George. 2004a. *The McDonaldization of Society*, Revised New Century Edition, Thousand Oaks, CA: Pine Forge Press.
- George Ritzer, 2004b. *The Globalization of Nothing*. Thousand Oaks, CA: Pine Forge Press.
- Wigner, E. P. and R. A. Hodgkin. 1977. Michael Polanyi: 12 March 1891 - 22 February 1976, Elected F.R.S.1944. *Biographical Memoirs of Fellows of the Royal Society* 23 (Nov): 413-448.